DSN Operations Control System

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A new network capability for high-speed transfer of operational control information has been implemented. The increase in speed is attributable to two things: use of high-speed data line instead of teletype yields a 24-fold increase, and source data is input in machine language instead of manually, yielding an additional increase.

A new DSN operations control system capability to send operational traffic from the SFOF to the DSSs by high-speed data (HSD) line has been implemented. There are currently three types of traffic that go by this mechanization: tracking predicts, DSN sequence of events, and DSN 7-day schedule.

The implementation uses the standard GCF HSD system, but required new designs in SFOF and DSIF. The encoding, formatting, and outputting is done in the SFOF by the operations control output router, a software part of the DSN monitor and operations control real-time processor. Reception and decoding are done at the DSS as part of the DSIF monitor program in the digital instrumentation subsystem Phase II (DIS II), with printout on the DIS line printer (and also a Magpak recording of tracking predicts).

To have a backup, and because not all DSSs have a DIS II, the output router can also output in Baudot code over teletype (TTY) lines for printout on a TTY machine, although any line of printing over 69 characters long is truncated (as opposed to a 132-character line on the DIS line printer).

For the two reasons given, tracking predicts and DSN 7-day schedules are constrained to a maximum of 69 characters per line, even when sent via HSD to the DIS line printer. The DSN sequence of events uses all 132 characters of a line printer, and thus cannot be sent by TTY. This is not considered to be a problem, as voice can be used as backup until reception capability is restored. (Prior to *Pioneer F* support, the remaining DSSs will also have this reception capability.)

The Mark II DSN had an output capability, but it was limited to transmitting tracking predicts by TTY; predicts generated on the 7094 were converted to Baudot code in the 7044 and sent to the GCF comm processor without personnel handling during the process. The DSN 7-day schedule and the sequence of events were handwritten for keyboard entry into the comm processor. The new output router can accept any type of traffic which is in machine language, does a code conversion (to XDS 6-bit BCD for DIS page prints, XDS floating point for Magpak recordings, and Baudot code for TTY transmission), reformats if required, adds the blanks and carriage functions needed in the page print output format, and meters the output onto GCF lines. Currently, "machine

language" means EBCDIC[1] coding on either magnetic tape or computer files, but may later be expanded to include the Univac 36-bit coding utilized in an available RF predicts program.

Comparison of the HSD medium and the TTY medium is straightforward. One line of print is put in each HSD block, and since the DIS line printer is capable of printing faster than the 4 HSD block per second rate of GCF, the network-wide speed is 4 printed lines per second via HSD line. TTY requires 6 s per printed line, so transmission by HSD is 24 times as fast as by TTY. Thus, predicts for initial acquisition, which require 14 min by TTY, will go in 35 s by HSD. For other traffic, the ratio is much higher when one considers that in the new system, a sequence of events (for example, one 200 items long) file is read and output and printed in less than a minute, whereas in the Mark II era it required several man-hours to condense a sequence to TTY page size, and then it was manually put onto TTY lines.

This capability clearly will help the DSN to give better support to missions with high activity, and to reduce station turnaround times.

[1]Extended binary-coded decimal interchange code.